

Konik Kothari

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Education

University of Illinois at Urbana-Champaign

Jan 2018 – Present

Ph.D. candidate in Electrical and Computer Engineering, GPA: 3.92/4.0

Thesis research: Machine learning for inverse problems in imaging **Advisor:** Prof. Ivan Dokmanić

Relevant Coursework: High-dimensional statistics, Computer Vision, Random Processes, Neural Networks and deep learning, Reinforcement Learning and MDPs, Pattern Recognition, Advanced Data Analysis, Applied Parallel Programming

M.S., Mechanical Engineering

Aug 2015 - May 2017

Indian Institute of Technology, Delhi, New Delhi, India

July 2010 – May 2014

B.Tech in Mechanical Science and Engineering, GPA: 9.13/10.0

Publications [Scholar]

- **Random mesh projectors for inverse problems** ICLR 2019

Authors: K. Kothari, S. Gupta, M. de Hoop, I. Dokmanić

We developed a method to regularize very ill-posed inverse problems via random projections that generalizes robustly out-of-dataset. We collaborated with **NASA Insight mission** to successfully estimate subsurface velocity profiles of Mars from “Marsquakes”; received **best poster award** in UIUC ECE graduate poster session.

- **Learning the geometry of wave-based imaging** (under review) arXiv:2006.05854v2

Authors: K. Kothari, M. de Hoop, I. Dokmanić

Based on microlocal analysis and Fourier integral operators (FIOs), we proposed a novel neural architecture for wave-based imaging that generalizes out-of-distribution, is interpretable and needs fewer samples to train.

- **Globally injective ReLU networks** (under review) arXiv:2006.08464

Authors: M. Puthawaala, K. Kothari, Dokmanić, M. Lassas, M. de Hoop

We presented necessary and sufficient conditions for when ReLU networks are globally injective. Our experiments demonstrated better inference performance. This is crucial for solving inverse problems under GAN priors.

- **Magellan: A Personalized Travel Recommendation System Using Transaction Data**, CIKM 2020

Authors: K. Kothari, D. Gelda, Wei Zhange, Hao Yang

We developed an end-to-end real-time travel recommendation system using only card transaction data.

- **Parsimonious Seismic Tomography with Poisson Voronoi Projections: Methodology and Validation**, Seismological Research Letters (2020) 91 (1), 343-355

Authors: H Fang, RD van der Hilst, MV de Hoop, K Kothari, S Gupta, I Dokmanić

We applied random mesh projections to real seismic data and achieved SoTA uncertainty quantification results.

- **Mechanical response of two-dimensional polymer networks: role of topology, rate dependence and damage accumulation**, J. Appl. Mech 85(3), 031008, Jan 2018

Authors: K. Kothari, Y. Hu, S. Gupta, A. Elbanna

We developed a deformation model for crosslinked polymer networks explaining how sacrificial bonds toughen hydrogels.

- **Localization and instability in sheared granular materials: Role of friction and vibration**, Phys. Rev. E 95, 022901, Feb 2017

Authors: K. Kothari, A. Elbanna

We developed a stress-strain model for granular materials under shear load explaining slip-stick phenomena.

Technical Skills

- Python, C/C++, MPI, CUDA, Pig, Hive, L^AT_EX
- Tensorflow, PyTorch

Work experience

- **Visa Research:** Research Intern, Data Analytics Team Summer 2018
Worked on building an a travel recommendation system mining billions of transactions
- **NVIDIA:** Data Science Intern, Intelligent Video Analytics Team Summer 2019
Worked on anomaly detection in vehicle trajectory data
- **GlaxoSmithKline Consumer Healthcare, India** Technical Supply Chain Engineer May, 2014-May, 2015
Future Leader's Program: Worked in a rotation engineering program in all verticals of supply chain.

Projects

Face-editing using GANs Spring 2018

- Built an interactive face-editing application using various variants of GANs (WGAN/ WGAN-GP/ SWGAN)

One-shot learning using memory-augmented neural networks Fall 2016

- Augmented a neural network with an external memory that has a recurrent neural network controller which is trained to read and write relevant representation of data in the external memory.
- Achieved accuracy greater than 80% within just 3 presentations of a class for the Omniglot dataset

Action-recognition using Deep Neural Networks Fall 2016

- Implemented a recurrent-neural network that classified video action data in the UCF-101 data-set. Features were extracted by fine-tuning a pre-trained VGGNet.

CUDA Accelerated Molecular Dynamics (MD) Fall 2015

- Developed million-particle CUDA accelerated MD and Markov Chain Monte Carlo simulations using GPU optimizations like memory coalescing, warp unrolling and shared memory optimization.

Reinforcement learning in OpenAI gym Fall 2017

- Developed the actor-critic algorithm for continuous control in MountainCarContinuous-v0 using neural networks

Google Foobar Coding Challenge Jan 2018

- Completed all 5 levels of the Google Foobar challenge (a secret invite-only challenge)

Teaching Experience

Digital Imaging (ECE558), UIUC Spring 2018

Held office hours for a class of 35 graduate students discuss various imaging modalities.

Engineering Materials (ME330), UIUC Spring 2016, Fall 2016

Conducted labs for 16 undergraduate students on tension/compression tests, impact tests, composites, alloy casting etc.

Introduction to statics (TAM210/211), UIUC Fall 2017

Held discussion sections with freshmen/ sophomores to solve mechanics problems.

Mechanical Engineering Drawing (MEP201), IIT Delhi Spring 2014

Helped a class of > 60 undergraduate students with weekly engineering design in-class assignments.

Mentorship experience

Mechanical Design Coordinator, Robotics Club, IIT Delhi 2013-2014

- Mentored a group of 14 sophomore students to build autonomous robots and manage club operations
- Held workshops on campus for freshmen to give them hands-on experience of building robots